

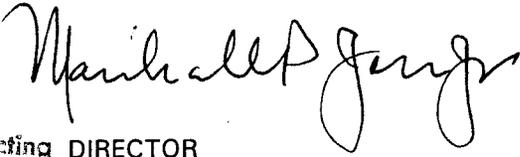


U.S. FISH AND WILDLIFE SERVICE TRANSMITTAL SHEET

PART	SUBJECT	RELEASE NUMBER
241 FW 3, 6, and 8	Safety Operations	442
FOR FURTHER INFORMATION CONTACT Division of Safety and Health	Personal Protective Equipment Electrofishing Energy Lockout/Tagout Program	DATE March 19, 2004

EXPLANATION OF MATERIAL TRANSMITTED:

241 FW 3 establishes policy and procedures for providing clothing and equipment that protects employees from hazards that may be encountered while performing their jobs. 241 FW 6 establishes requirements for the safe conduct of electrofishing. 241 FW 8 outlines the requirements and responsibilities for controlling the unintentional release of hazardous energy that could cause injury or damage while machines and equipment are being maintained and/or serviced.


Acting DIRECTOR

FILING INSTRUCTIONS:

Remove:

241 FW 3, 03/24/92, FWM 018
None
Appendix 1, 241 FW 3, 03/24/92, FWM 018
Appendix 3, 241 FW 3, 03/24/92, FWM 018
Appendix 2, 241 FW 3, 03/24/92, FWM 018
Appendix 4, 241 FW 3, 03/24/92, FWM 018
Exhibit 1, 241 FW 3, 03/24/92, FWM 018

241 FW 6, 10/12/92, FWM 036
Exhibit 1, 241 FW 6, 10/12/92, FWM 036

241 FW 8, 10/12/92, FWM 037

Insert:

241 FW 3, 03/19/04, FWM 442
Exhibit 1, 241 FW 3, 03/19/04, FWM 442
Exhibit 2, 241 FW 3, 03/19/04, FWM 442
Exhibit 3, 241 FW 3, 03/19/04, FWM 442
Exhibit 4, 241 FW 3, 03/19/04, FWM 442
None
None

241 FW 6, 03/19/04, FWM 442
None

241 FW 8, 03/19/04, FWM 442

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3.1 What is the purpose of this chapter? This chapter outlines the Fish and Wildlife Service (Service) requirements and responsibilities for giving you clothing and equipment that protects you from hazards that you may encounter while performing your job tasks.

3.2 Who does the Personal Protective Equipment (PPE) Program apply to? It applies to all Service employees, volunteers, Job Corps and Youth Conservation Corps members and students, and seasonal workers who need PPE to protect them from hazards we have identified in their workplaces.

3.3 What are the authorities for this chapter?

A. Executive Order 12196, Occupational Safety and Health Programs for Federal Employees.

B. Public Law 91-596, Sec 19, Federal Agency Safety Programs and Responsibilities.

C. 29 CFR 1910.132-133 and 135-138, Occupational Safety and Health Administration's (OSHA) General Industry Personal Protective Equipment Standards.

D. 29 CFR 1960, Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters.

E. American National Standards Institute (ANSI) standards incorporated in the Occupational Safety and Health Act (29 CFR 1910).

F. National Institute for Occupational Safety and Health (NIOSH) Personal Protective Equipment Guidance.

3.4 Who is responsible for the Personal Protective Equipment Program?

A. The Chief, Division of Safety and Health will:

(1) Revise and update this chapter, as necessary.

(2) Provide interpretation of the Personal Protective Equipment Program requirements and serve as a consultant to resolve Servicewide questions or issues.

B. Regional Directors and Manager, California/Nevada Operations Office (CNO) must provide sufficient support and resources to effectively implement the Personal Protective Equipment Program in their areas of responsibility.

C. Regional/CNO Safety Managers must:

(1) Provide interpretation of the Personal Protective Equipment Program requirements and serve as an advisor to resolve Regionwide/CNOWide questions and issues.

(2) Evaluate implementation of the Personal Protective Equipment Program during Regional/CNO field station safety program evaluations.

(3) Assist project leaders/supervisors with developing job hazard assessments.

D. Project Leaders/Supervisors must make sure all aspects of the PPE Program are implemented in their facilities and workplaces. They must:

(1) Conduct thorough job hazard assessments to make sure that **all** hazards are identified, and take action to eliminate or reduce the hazards. Verify that these assessments have been performed through a written certification. Consult with the Regional/CNO Safety Manager for assistance with developing hazard assessments.

(2) Make sure employees have proper PPE to protect them from workplace hazards **and** are trained on how to select, use, maintain and clean it. Consult with the Regional/CNO Safety Manager for assistance in selecting appropriate PPE.

(3) Attend PPE training.

(4) Make sure that employees properly select, use, maintain and clean their PPE. Take appropriate disciplinary action if employees do not wear and properly maintain and clean their PPE.

(5) Immediately repair or replace defective or damaged PPE.

(6) Maintain records on PPE assignments and training.

E. Employees must comply with all Personal Protective Equipment Program requirements, including:

(1) Wear PPE as we require.

(2) Complete all PPE training.

(3) Clean and keep all PPE in good and serviceable condition.

(4) Tell their supervisors when PPE needs to be repaired or replaced.

3.5 What is the Service policy regarding use of Personal Protective Equipment? We will take actions that protect you from known hazards in your workplace. We will use PPE only when equipment engineering controls, or management controls do not adequately protect you. When we cannot eliminate all known hazards, we will give you PPE at no cost to you. We will select PPE that is designed to protect you from the workplace hazards

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we have identified. The equipment will meet all current ANSI or equivalent industry standards, and we will make sure that it fits you properly. We will train you on how and when to use the PPE, its limitations, and how to maintain and clean it.

3.6 What is the definition of Personal Protective Equipment? Any clothing or equipment that is designed to protect any part of your body from workplace hazards that you can absorb, inhale, or that can physically touch you.

3.7. What is the Personal Protective Equipment Program? The Occupational Safety and Health Administration (OSHA) requires us to protect you from potentially hazardous conditions in your workplace. When we are unable to eliminate all identified hazards in your workplace, we must provide equipment that will act as a barrier against injury to you and your health. Specific information on the PPE Program can be found at <http://www.osha.gov/SLTC/personalprotectiveequipment/index.html>. The program must include protection of the eye, face, foot, hand, head and leg.

3.8. What are the major elements of the Personal Protective Equipment Program? A Personal Protective Equipment Program will contain, but is not limited to:

- A. Job hazard assessments.
- B. Selection of appropriate PPE.
- C. Employee training.
- D. Recordkeeping.

3.9 What is a job hazard assessment? A job hazard assessment is a process of identifying real or potential safety and occupational health risks for specific jobs within the workplace that might require the use of PPE to protect employees. The assessment includes identifying the specific PPE needed in each workplace. **Note:** Project leaders/supervisors responsible for conducting hazard assessments must use FWS Form 3-2279 (Job Hazard Assessment) to record their findings and recommendations for type of PPE, its use, and necessary employee training. Exhibit 1 contains a description of the process and the procedure for conducting a job hazard assessment.

3.10 What are the Service requirements for selecting PPE? All PPE will be of safe design and construction for the work you perform. We will purchase or allow you to use only PPE that meets ANSI, NIOSH or equivalent industry standards. We will consider your comfort and fit of PPE when selecting it. All PPE will be maintained in a sanitary condition, by you or by a person we assign to maintain it.

3.11 Am I allowed to buy and wear my own PPE? You may use PPE you buy for your personal convenience,

although we do not recommend it. Before we allow you to use PPE you purchase for yourself, it must:

A. Meet the same requirements as the Service provided PPE and

B. Be approved by your project leader/supervisor and the Regional/CNO Safety Manager.

3.12 Do I own the PPE the Service gives me to use? While you may have exclusive use of the Service-purchased PPE, it remains the property of the Service. You must return those PPE items that can be reused by other personnel. Items such as prescription safety glasses or safety shoes/boots that are generally used by only one person may be kept by the employee.

3.13 What are the types of PPE that I might be required to use? Exhibit 2 lists our recommendations for types of PPE you should use for various job tasks. This is only general information. Your project leader/supervisor may require you to use other PPE, based on your job hazard assessment. **Note:** We have separate programs for respiratory and hearing protection because industrial hygiene monitoring is required to participate in those programs. Hearing Protection Program requirements are in 242 FW 3 and Respiratory Protection Program requirements are in 242 FW 14.

- A. Electrical Protective Equipment (paragraph 3.14).
- B. Eye and Face Protection (paragraphs 3.15, 3.16, and 3.17 and Exhibit 2).
- C. Foot Protection (paragraph 3.18).
- D. Hand Protection (paragraph 3.19 and Exhibit 3).
- E. Head Protection (paragraph 3.20).
- F. Leg Protection (paragraph 3.21).
- G. Other special types of protective equipment we determine you need (paragraph 3.22).

3.14 What are the requirements for electrical protective equipment? You may be required to use electrical protective equipment such as insulating blankets, matting, covers, line hose, gloves, and sleeves made of rubber when exposed to electrical hazards. Your project leader/supervisor will decide what specific PPE you need to protect you from electrical hazards in your workplace.

3.15 What are the requirements for eye protection? We require all persons who may be in eye hazard areas to wear ANSI approved protective eyewear, including employees, visitors, volunteers, and contractors. Project leaders/supervisors must have a sufficient quantity of suitable eye protectors available for all persons who might come into or through the eye hazard area. No one will be

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allowed in the workplace if suitable eye protection is not available. **Note:** You may refer to the Eye and Face Protection Selection Chart in Exhibit 3 for more information on what PPE is recommended for specific job tasks.

A. Project leaders/supervisors will make sure that caution signs are placed outside eye hazard areas. The signs will require everyone to put on eye protection before entering the area.

B. Suitable protectors will be used when you are exposed to hazards from flying particles, molten metal, acids or caustic liquids, chemical liquids, gases, or vapors, or potentially injurious light radiation.

C. You will wear an eye protection device that provides side protection if there is a hazard from flying objects. Detachable side protectors are permitted.

D. Your project leader/supervisor will make sure that eye and face PPE is distinctly marked to easily identify the manufacturer.

E. You must use filter lenses that have a shade number appropriate for the work you are doing if there is a hazard from light radiation (i.e., welding). Refer to Exhibit 3 for a chart of appropriate shade numbers for various job tasks.

F. We will provide ANSI approved emergency eyewash facilities in all workplaces where your eyes may be exposed to corrosive materials. The eyewash facilities will be easily accessible to you in an emergency and provided for continuous flushing of the eyes for at least 15 minutes. First-aid instructions will be posted nearby.

3.16 I wear prescription glasses. What are the Service requirements for my eye protection? If we require you to go into an eye hazard area:

A. We will buy prescription safety glasses for you if you are exposed to eye hazards on a routine basis. **Note:** Be sure to inform your project leader/supervisor if your eyewear prescription changes.

B. We will give you goggles or face shields designed to fit over standard eye glasses if you are only occasionally exposed to eye hazards. The goggles or face shields must fit properly over your prescription glasses.

3.17 I wear contact lenses. Do I have to wear eye protection? Contact lens wearers must wear appropriate eye and face protection devices in areas we have determined require eye protection.

A. Contact lenses may increase the hazard to your eyes in some instances. Your project leader/supervisor will thoroughly evaluate the hazards in your workplace to

decide if we can allow you to wear contact lenses while you do your job.

B. You **are not** allowed to wear contact lenses while you are working with or around chemicals, fumes, smoke, dust, flying particles, or molten metals that may increase your chance of injury because of the contact lenses.

3.18 What are the requirements for wearing foot protection? We will give you steel-toed safety shoes or other appropriate foot protection if we decide your job exposes you to possible foot injury.

A. You must wear safety shoes or boots with impact protection when your work involves carrying or handling materials such as packages, objects, parts or heavy tools which could be dropped; and for other activities where objects might fall onto your feet and cause injury.

B. You must wear safety shoes or boots with compression protection for work activities involving skid trucks (manual material handling carts), heavy equipment, and around heavy pipes.

C. You must wear safety shoes or boots with puncture protection if you work where you could step on sharp objects such as nails, wire, tacks, screws, large staples, scrap metal.

D. You must wear special types of foot protection when you work around electrical equipment or in areas with extreme temperatures (hot or cold).

3.19 What are the requirements for wearing hand protection? You must use protective gloves whenever you work with or handle any equipment or materials likely to be hazardous to your hands. Hand hazards include skin absorption of harmful substances; severe cuts or scrapes; punctures; chemical or thermal burns; and harmful temperature extremes. We recommend you use barrier creams to prevent dermatitis when you work with chemicals. Project leaders/supervisors will give you the appropriate hand protection materials based on their assessment of your workplace hazards. **Note:** See Exhibit 4 for a guide to the most common types of protective work gloves and the types of hazards they can protect against.

A. Gloves should be replaced periodically, depending on how often you use them and how dirty they get.

B. Do not wear gloves around moving machinery, such as drill presses, mills, lathes, and grinders.

3.20 What are the requirements for wearing head protection? We will give you head protection that resists penetration and absorbs the shock of a blow. Protective hats are also used to protect you against electric shock.

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A. Project leaders/supervisors will make sure that safety helmets or hard hats are kept in stock and given to everyone entering a workplace or vessel when there is a danger of head injuries from falling objects or other hazards.

B. You will wear protective head gear (i.e., safety helmets or hard hats) when working in areas or on jobs where there is a potential for injury to the head from falling objects. Such areas or jobs would involve construction, moving or dumping of earth, rock and gravel; operating cranes; logging and clearing bush and woodlands; whenever chain saws are being used; and other similar types of work.

C. Safety helmets and hard hats will meet the ANSI standards for Industrial Head Protection, Type 1, Class A or B. **Note:** Type 1, Class B helmets protect the head from high-voltage shock and burns in addition to protecting from falling or flying objects. They should be used by electrical workers.

D. Project leaders/supervisors must make sure that employees know how to properly adjust the headband and suspension, and how to properly store and clean their helmet or hard hat.

3.21 What are the requirements for wearing leg protection? We require you to use special equipment to prevent leg injuries when and where circumstances warrant. For example:

A. You must wear leg chaps when you are operating a chain saw or working in an area where chain saws are being operated.

B. You must wear leg guards to protect you from snake bite when you work in areas where you may encounter snakes.

3.22 What other types of protective equipment might the Service require me to wear? We will give you other types of protective equipment to meet special conditions, provided you would not normally purchase the equipment for your personal use. For example, we would buy you winter liner or ear covers for your hard hat; but you would buy your own sweater or shirt. Project leaders/supervisors may buy any other PPE not listed in this chapter, if they decide it is necessary to protect you, and if you would not ordinarily purchase it for your personal use. Examples of other types of protective equipment are:

A. We will give you protective aprons, rubber boots, waders and rain gear at fish hatcheries, refuges, laboratories and for other activities and installations requiring them. Rubber boots will have steel toe protection.

B. We will give you and require you to wear fire retardant clothing for special use, low level (less than 152.4 meters/500 feet) or mountainous flight missions. Note:

Some aviation PPE requirements are different, see the aviation policies (Part 334) for specifics.

3.23 What are the Service requirements for cleaning and maintaining PPE? It is important that you keep PPE clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair your vision.

A. You are responsible for cleaning and maintaining the PPE we give you to use, unless your project leader/supervisor specifically assigns that responsibility to someone else.

B. Project leaders/supervisors must make sure their employees' PPE is inspected, cleaned, and maintained regularly.

C. Project leaders/supervisors should establish a written schedule for PPE inspection, and assign someone the responsibility for monitoring the condition of all PPE.

D. Employees will not share PPE until it has been properly cleaned and sanitized. We will distribute PPE for individual use whenever possible.

E. Employees will not use defective or damaged PPE.

F. When not in use, goggles and safety glasses should be stored in a location where they will not be damaged, and can be stored in a "Ziploc" type baggie, for added protection from potential environmental contamination.

3.24 What training do I need if I have to wear Personal Protective Equipment while performing my job?

A. We will train you to know the following, as a minimum:

- (1) When PPE is necessary.
- (2) What PPE is necessary for which job tasks.
- (3) How to properly put on, remove, adjust and wear PPE.
- (4) The limitations of the PPE.
- (5) The proper care, maintenance, useful life and disposal of the PPE.

B. Your project leader/supervisor will require you to demonstrate that you understand the PPE training and that you can use your PPE properly before we allow you to use it on the job.

C. We will retrain you when there are changes in your workplace conditions or in the types of PPE we require you to use, or when we think your need to have additional PPE training.

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3.25 What recordkeeping is required?

A. The project leaders/supervisors must keep written records of PPE training you receive for the duration of employment. Training records will include:

- (1) Name of person trained.
- (2) Date of the training.
- (3) Type of training provided.

B. Project leaders/supervisors must certify in writing that they have evaluated each workplace for hazards that might need PPE use.

- (1) The document must state that it is a "certification of hazard assessment."
- (2) The document must identify the workplace evaluated, the person certifying that the evaluation was performed, and the dates of the hazard assessment.
- (3) The person certifying the evaluation may use FWS Form 3-2279 to meet this requirement.
- (4) Project leaders/supervisors must keep the Certification of Hazard Assessment for their workplaces for the duration of your employment.

Job Hazard Assessment

Job hazard assessment is a systematic process for identifying hazards and eliminating or minimizing their risks. First you break down a job or activity into basic steps and examine each step for potential hazards. For larger or more complex operations, you may need to first divide the operation into several activities or substeps. For each hazard you identify, you must develop a means of eliminating or controlling the hazard. You can also use a completed FWS Form 3-2279 (Job Hazard Assessment) as a guide for training employees in proper work procedures.

1. Follow these basic steps to complete a job hazard assessment:

A. Basic Job Steps: List the steps necessary to accomplish the job in the order you would do them.

B. Hazards: List the tools, equipment, materials, or chemicals used for each job step, and the environment they will be accomplished in, if appropriate. List the conditions or events which could cause injury, illness, property loss for each step.

C. Safe Job Procedures: List the actions, controls, protective clothing or equipment that will eliminate or reduce the hazards identified for each step.

2. Contact your Regional/CNO Safety Office for assistance with performing these assessments.

If your job task is	Then we recommend you use
Surveying	Hard hat (high visibility hard hat and vest during hunting season), eye protection, safety boots
Demolition	Hard hat, gloves, eye protection, safety boots, hearing protection and respirator for dust*
Electrofishing	Electrician gloves, personal flotation device, polarized sunglasses, waders
Excavation	Hard hat, safety boots, gloves, hearing protection
Fencing	Hard hat, gauntlet leather gloves or mittens, eye protection, safety boots
Firefighting and prescribed burning	Hard hat, fire-resistant shirts, fire shelter, eye protection, fire-resistant pants, gloves, hearing protection
Fish food and grain storage bin unloading operations	Static line, dust and fume respirator*
Girdling ("Little Beaver")	Hard hat, eye and hearing protection, safety boots, gloves
Grinding	Eye protection, face or full shield, hearing protection, safety boots
Hand-filing cutting tools, use of	Gloves, eye protection
Heavy equipment, motor graders, and bulldozer operation	Hard hat, hearing and eye protection, boots
Heavy equipment assistant	Hard hat, high visibility vest, hearing protection, gloves

* Respirator use is required if personal exposures to vapors, fumes, dusts, etc. exceed applicable OSHA Permissible Exposure Limits. See 242 FW 14 for Respiratory Protection Program requirements.

If your job task is	Then we recommend you use
Heavy equipment repair and maintenance	Safety boots, hearing and eye protection, gloves
Intake raceway	Foul weather gear, safety harness
Lawn mowing (motorized)	Hearing and eye protection, safety boots
Planting using: hand auger machine	Hard hat, eye protection, gloves safety boots Hard hat, hearing and eye protection, gloves, safety boots Hard hat, eye protection, gloves, safety boots
Pruning	Hard hat, eye protection, gloves, safety boots
Raceway operations	Ice cleats (inclement weather), waders, hearing protection
Remote operations	Portable radios and cell phones
Snowmobile operation	Safety sunglasses, face mask, protective helmet, snowsuit, snowmobile boots, gloves
Thinning with: ax hypo-hatchet tree injector	Hard hat, shin guards, eye protection, gloves, safety boots Eye protection, hard hat, gloves, safety boots Hard hat, eye protection, gloves, safety boots
Trail maintenance	Hard hat, gloves, eye protection, safety boots, snake boots where necessary
Tree telling and thinning with chainsaw	Chaps, hard hat, eye and hearing protection, gloves, safety boots

If your job task is	Then we recommend you use
Waster water treatment plant operations involving chlorine gas	Self contained breathing apparatus*
Water surveys	Personal flotation devices, felt sole boots or waders
Weapons qualification	Eye and hearing protection, bullet proof vests
Welding	Flameproof gauntlet gloves, aprons, capes or shoulder covers, leather skull cap, welding goggles, steel-toed boots, fire-resistant clothing, respiratory protection*
Wildlife Inspections: Trophy Shipments & Non-Human Primate Shipments	See 241 FW 9

* Respirator use is required if personal exposures to vapors, fumes, dusts, etc. exceed applicable OSHA Permissible Exposure Limits. See 242 FW 14 for Respiratory Protection Program requirements.

The following standards are those used by OSHA to determine the minimum required protection PPE must provide in order to be acceptable. Only purchase PPE which meet these standards.

1. ANSI Z87.1-1989 (R -1998), American National Standard for Personal Protection, Practice for Occupational and Educational Eye and Face Protection.
2. ANSI Z89.1-1986, American National Standard for Personal Protection, Protective Headwear for Industrial Workers.
3. ANSI Z41-1999, American National Standard for Personal Protection, Protective Footwear.
4. American Society for Testing and Materials (ASTM) D, Specifications for rubber insulating gloves.

Eye and Face Protection Selection Chart

Source	Hazard	Protection
IMPACT - Chipping, grinding machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding	Flying fragments, objects, large chips, small particles, sand, dirt, etc.	Spectacles with side protection, at a minimum for large particles, goggles for grinding/sawing and fine particles and dust, face shield. <i>For severe exposure, use face shield. See note 5.</i>
HEAT - Furnace operation and arc welding, plasma cutting, torch cutting applications	Hot sparks	Face shields, spectacles with side protection. For severe exposure use face shield.
CHEMICALS - Acid and chemical handling, degreasing, plating, overhead painting operations	Splash	Goggles, eyecup and cover type. <i>For severe exposure, use face shield. See notes 4 and 6.</i>
DUST - Woodworking, buffing, general dusty conditions.	Nuisance dust	Goggles, eyecup and cover type.
LIGHT and/or RADIATION Welding: Electric arc Welding: Gas Cutting, Torch brazing, Torch soldering	Optical radiation Optical radiation Optical radiation	Welding helmets or welding shields. <i>See notes 1, 2 and 3.</i> Welding goggles or welding face shield. <i>See note 1.</i> Spectacles or welding faceshield. <i>See notes 1 and 4.</i>
Glare	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable. <i>See notes 1 and 5.</i>

Notes to Eye and Face Protection Selection Chart:

1. Welding helmets or face shields should be used only over primary eye protection (spectacles or goggles).
2. Protection from light radiation is directly related to filter lens density. Select the darkest shade that allows you to do the job task.
3. Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.
4. Face shields should only be worn over primary eye protection (spectacles or goggles).
5. Non-side shield spectacles are available for frontal protection only, but aren't acceptable eye protection for the sources and operations listed for "impact".
6. Ventilation should be adequate, but well protected from splash entry. Eye and face protection should be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry.

Filter Lenses for Protection Against Radiant Energy

Operations	Electrode Size 1/32 inch	Arc Current	Protective Shade
Shielded metal arc welding	Less than 3	Less than 60	7
	3-5	80-160	8
	5-8	160-250	10
	More than 8	250-550	11
Torch brazing			3
Torch soldering			2

Note: As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

ANSI Z87.1-1989 (R-1998) is the standard used by OSHA to determine the minimum required protection PPE must provide in order to be acceptable. Only purchase eye and face protection which meet this standard.

Selection Guide for Gloves

This guide describes the most common types of protective work gloves and the types of hazards they guard against.

1. Disposable Gloves. Usually made of light-weight plastic. They can help guard against mild irritants.

2. Fabric Gloves. Made of cotton or fabric blend. They are generally used to help improve your grip when handling slippery objects. They also help insulate your hands from mild heat or cold.

3. Leather Gloves. Used to guard against injuries from sparks or scraping against rough surfaces. You should use them in combination with an insulated liner if you are working with electricity.

3. Chemical Resistance Gloves. May be made of rubber, neoprene, polyvinyl alcohol or vinyl, etc. They protect your hands from corrosives, oils, and solvents.

4. Metal Mesh Gloves. Used to protect your hands from accidental cuts and scratches. They are used most commonly by persons working with cutting tools or other sharp instruments.

5. Aluminized Gloves. Made of aluminized fabric. They are designed to insulate your hands from intense heat. These gloves are most commonly used by persons working with molten materials.

The following tables are guides to the different types of glove materials and the chemicals they will protect you against. **Note**¹: When you are selecting chemical resistance gloves, be sure to consult the manufacturer's recommendations, especially if your gloved hand will be immersed in the chemical. **Note**²: Latex gloves are known to cause allergic reactions to individuals donning the gloves. Please substitute another appropriate non-latex glove from the attached chart and replace it.

Glove Chart

Type	Advantages	Disadvantages	Use Against
Natural Rubber	Low cost, good physical properties, dexterity	Poor against oils, greases, organics. Frequently imported; may be poor quality	Bases, alcohols, dilute water solutions; fair against aldehydes, ketones
Natural rubber blends	Low cost, dexterity, better chemical resistance than natural rubber against some chemicals	Physical properties frequently inferior to natural rubber	Bases, alcohols, dilute water solutions; fair against aldehydes, ketones
Polyvinyl chloride (PVC)	Low cost, very good physical properties, medium cost, medium chemical resistance	Plasticizers can be stripped; frequently imported may be poor quality	Strong acids and bases, salts, other water solutions, alcohols
Neoprene	Medium cost, medium chemical resistance, medium physical properties		Oxidizing acids, anilines, phenol, glycol ethers
Nitrile	Low cost, excellent physical properties, dexterity	Poor against benzene, methylene chloride, trichloroethylene, many ketones	Oils, greases, aliphatic chemicals, xylene, perchloroethylene, trichloroethane; fair against toluene
Butyl	Specialty glove, polar organics	Expensive, poor against hydrocarbons, chlorinated solvents	Glycol ethers, ketones, esters
Polyvinyl alcohol (PVA)	Specialty glove, resists a very broad range of organics, good physical properties	Very expensive, water sensitive, poor against light alcohols	Aliphatics, aromatics, chlorinated solvents, ketones (except acetone), esters, ethers
Fluoroelastomer (Viton)*	Specialty glove, organic solvents	Extremely expensive, poor physical properties, poor against some ketones, esters, amines	Aromatics, chlorinated solvents, also aliphatics and alcohols
Norfoil (Silver Shield)	Excellent chemical resistance	Poor fit, easily punctures, poor grip, stiff	Use for Hazmat work

*Trademark of DuPont Dow Elastomers

Glove Type and Chemical Use

*Limited service	VG = Very Good	G = Good	F = Fair	P = Poor (not recommended)
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Chemical	Neoprene	Natural Rubber	Butyl	Nitrile
*Acetaldehyde	VG	G	VG	G
Acetic acid	VG	VG	VG	VG
*Acetone	G	VG	VG	P
Ammonium hydroxide	VG	VG	VG	VG
*Amyl acetate	F	P	F	P
Aniline	G	F	F	P
*Benzaldehyde	F	F	G	G
*Benzene	F	F	F	P
Butyl acetate	G	F	F	P
Butyl alcohol	VG	VG	VG	VG
Carbon disulfide	F	F	F	F
*Carbon tetrachloride	F	P	P	G
Castor oil	F	P	F	VG
*Chlorobenzene	F	P	F	P
*Chloroform	G	P	P	P
Chloronaphthalene	F	P	F	F
Cromic Acid (50%)	F	P	F	F
Citric acid (10%)	VG	VG	VG	VG
Cyclohexanol	G	F	G	VG
*Dibutyl phthalate	G	P	G	G
Diesel fuel	G	P	P	VG

Chemical	Neoprene	Natural Rubber	Butyl	Nitrile
Diisobutyl ketone	P	F	G	P
Dimethylfomamide	F	F	G	G
Dioctyl phthalate	G	P	F	VG
Dioxane	VG	G	G	G
Epoxy resins, dry	VG	VG	VG	VG
*Ethyl acetate	G	F	G	F
Ethyl alcohol	VG	VG	VG	VG
Ethyl ether	VG	G	VG	G
*Ethylene dichloride	F	P	F	P
Ethylene glycol	VG	VG	VG	VG
Formaldehyde	VG	VG	VG	VG
Formic acid	VG	VG	VG	VG
Freon 11	G	P	F	G
Freon 12	G	P	F	G
Freon 21	G	P	F	G
Freon 22	G	P	F	G
*Furfural	G	G	G	G
Gasoline, leaded	G	P	F	VG
Gasoline, unleaded	G	P	F	VG
Glycerine	VG	VG	VG	VG
Hexane	F	P	P	G
Hydrochloric acid	VG	G	G	G
Hydrofluoric acid (48%)	VG	G	G	G
Hydrogen peroxide (30%)	G	G	G	G
Hydroquinone	G	G	G	F

Chemical	Neoprene	Natural Rubber	Butyl	Nitrile
Isooctane	F	P	P	VG
Isopropyl alcohol	VG	VG	VG	VG
Kerosene	VG	F	F	VG
Ketones	G	VG	VG	P
Lacquer thinners	G	F	F	P
Lactic acid (85%)	VG	VG	VG	VG
Lauric acid 36 %	VG	F	VG	VG
Lineoleic acid	VG	P	F	G
Linseed oil	VG	P	F	VG
Maleic acid	VG	VG	VG	VG
Methyl alcohol	VG	VG	VG	VG
Methylamine	F	F	G	G
Methyl bromide	G	F	G	F
*Methyl chloride	P	P	P	P
*Methyl ethyl ketone	G	G	VG	P
*Methyl isobutyl ketone	F	F	VG	P
Methyl methacrylate	G	G	VG	F
Monoethanolamine	VG	G	VG	VG
Morpholine	VG	VG	VG	G
Naphthalene	G	F	F	G
Naphthalene, aliphatic	VG	F	F	VG
Naphthalene, aromatic	G	P	P	G
*Nitric acid	G	F	F	F
Nitromethane (95.5%)	F	P	F	F
Nitropropane (95.5%)	F	P	F	F
Octyl alcohol	VG	VG	VG	VG

Chemical	Neoprene	Natural Rubber	Butyl	Nitrile
Oleic acid	VG	F	G	VG
Oxalic acid	VG	VG	VG	VG
Palmitic acid	VG	VG	VG	VG
Perchloric acid (60%)	VG	F	G	G
Perchloroethylene	F	P	P	G
Petroleum distillates (naphtha)	G	P	P	VG
Phenol	VG	F	G	F
Phosphoric acid	VG	G	VG	VG
Potassium hydroxide	VG	VG	VG	VG
Propyl acetate	G	F	G	F
Propyl alcohol	VG	VG	VG	VG
Propyl alcohol (iso)	VG	VG	VG	VG
Sodium hydroxide	VG	VG	VG	VG
Styrene	P	P	P	F
Styrene (100%)	P	P	P	F
Sulfuric acid	G	G	G	G
Tannic acid (65%)	VG	VG	VG	VG
Tetrahydrofuran	P	F	F	F
*Toluene	F	P	P	F
Toluene diisocyanate	F	G	G	F
*Trichloroethylene	F	F	P	G
Triethanolamine	VG	G	G	VG
Tung oil	VG	P	F	VG
Turpentine	G	F	F	VG
*Xylene	P	P	P	F